Claims

1) A method of normalising the output values of a laser diode, the method comprising the steps of:

a) varying the control currents for a specific section of a laser diode device over a range of values in a first sample index so as to obtain a set of output values for that section of the laser diode,

b) normalising the set of output values; and

wherein the normalisation of the output values compensates for non-linearities in the output values by effecting a change in relationship between the control currents and the sample index.

2) The method as claimed in claim 1 wherein the output values are representative of power or frequency.

3) The method as claimed in claim 1 or 2 further comprising the step of obtaining a set of normalised values for one or more further sections of the laser.

4) The method as claimed in claim 1 wherein the normalisation is effected by a transform applied to sample index, thereby changing the control currents and the output values.

5) The method as claimed in claim 4 wherein the transform is a non-linear transform.

6) The method as claimed in claim 4 or 5 wherein the generated transform is subsequently used to effect the further generation of a set of output values for multiple combinations of control currents or sections for the laser device, the generated set having being normalised due to the utilisation of the transform.

7) The method as claimed in claim 1 wherein the normalisation of the output values is effected using the current of the mode jumps.

8) The method as claimed in claim 7 wherein mode jumps are detected by a power measurement.

9) The method as claimed in claim 8 wherein the mode jumps are represented by discontinuities in a power measurement.

10) The method as claimed in claim 7 wherein mode jumps are detected by a frequency measurement.

11) The method as claimed in claim 8 wherein the mode jumps are represented by a step in a frequency measurement.

12) The method as claimed in claim 4 wherein the application of the transform effects an equalisation of mode width.

13) The method as claimed in claim 12 further comprising the step of determining deviations in mode width, thereby providing indications of the integrity of the laser device.

14) The method as claimed in claim 1 wherein the normalisation is effected using a relative loss of that section as a function of control current.

15) The method as claimed in claim 14 wherein the gain current of the laser device can be altered using said normalisation.

16) The method as claimed in claim 1 wherein the normalisation output values provides for a determination of location of modes.

17) The method as claimed in claim 16 further comprising the step of determining suitable operating points, the operating points being selectable on the basis of a determination of a mid-point in frequency values for a specific mode.

18) The method as claimed in claim 17 wherein the operating point is at the mean frequency for that mode and benefits from maximum side mode suppression.

19) The method as claimed in claim 16 wherein the mode are locatable by effecting a differentiating of the normalised values.

20) A method of determining a mode width for a laser diode device, the method comprising the steps of:

a) determining the location of the modes;

b) extracting from the determined mode locations, the mode width in control current as a function of a

control current for all modes and all currents so as to provide for a relationship between the mode width of the laser and a control current for that laser; and

c) converting the control current to frequency for the device so as to provide a relationship between mode width and frequency.

21) A method of obtaining the mode modulation for a laser diode, the method comprising steps of:

obtaining tuning characteristics of a tunable laser and measuring a set of sample data where this data has been normalised out;

detecting mode jumps of the tunable laser;

measuring a mode width of the laser and plotting this value against a predetermined combination of control currents for the tunable laser where this mode is present which can in turn be converted to output frequency of the tunable laser; and

converting the mode width to a percentage deviation of average mode width of the laser.

22) A computer program comprising program instructions for causing a computer to perform the method of any one of claims 1 to 21.

23) A computer program as claimed in claim 22 embodied on a record medium.

24) A computer program as claimed in claim 22 embodied on a carrier signal.

25) A computer program as claimed in claim 22 embodied on a read-only memory.

26) A control system for normalising the output values of a laser diode, the system comprising :

means to vary the control currents for a specific section of a laser diode device over a range of values in a first sample index so as to obtain a set of output values for that section of the laser diode;

means to normalise the set of output values; and

wherein the normalisation of the output values compensates for non-linearities in the output values by effecting a change in relationship between the control currents and the sample index.

27) The system as claimed in claim 26 wherein the output values are representative of power or frequency.

28) The system as claimed in claim 26 or 27 further comprising means for obtaining a set of normalised values for one or more further sections of the laser.

29) The system as claimed in claim 26 wherein the normalisation is effected by a transform applied to the sample index, thereby changing the control currents and the output values.

30) The system as claimed in claim 29 wherein the transform is a non-linear transform.

31) The system as claimed in claim 29 or 30 wherein the generated transform is subsequently used to effect the further generation of a set of output values for multiple combinations of control currents or sections for the laser device, the generated set having being normalised due to the utilisation of the transform.

32) The system as claimed in claim 26 wherein the normalisation of the output values is effected using the current of the mode jumps.

33) The system as claimed in claim 32 wherein mode jumps are detected by a power measurement.

34) The system as claimed in claim 33 wherein the mode jumps are represented by discontinuities in a power measurement.

35) The system as claimed in claim 32 wherein mode jumps are detected by a frequency measurement.

36) The system as claimed in claim 33 wherein the mode jumps are represented by a step in a frequency measurement.

37) The system as claimed in claim 29 wherein the application of the transform effects an equalisation of mode width.

38) The system as claimed in claim 37 further comprising means for determining deviations in mode width, thereby providing indications of the integrity of the laser device.

39) The system as claimed in claim 26 wherein the normalisation is effected using a relative loss of that section as a function of control current.

40) The system as claimed in claim 39 wherein the gain current of the laser device can be altered using said normalisation.

41) The system as claimed in claim 26 wherein the normalisation output values provides for a determination of location of modes.

42) The system as claimed in claim 41 further comprising means for determining suitable operating points, the operating points being selectable on the basis of a determination of a mid-point in frequency values for a specific mode.

43) The system as claimed in claim 42 wherein the operating point is at the mean frequency for that mode and benefits from maximum side mode suppression.

44) The system as claimed in claim 41 wherein the mode are locatable by effecting a differentiating of the normalised values.

45) A control system for determining a mode width for a laser diode device, the system comprising :

means for determining the location of the modes;

means for extracting from the determined mode locations, the mode width in control current as a function of a control current for all modes and all currents so as to provide for a relationship between the mode width of the laser and a control current for that laser; and

means for converting the control current to frequency for the device so as to provide a relationship between mode width and frequency.

46) A control system for obtaining a mode modulation for a laser diode, the system comprising:

means to obtain tuning characteristics of a tunable laser and means to measure a set of sample data where this data has been normalised out;

means to detect mode jumps of the tunable laser;

means to measure a mode width of the laser and plotting this value against a predetermined combination of control currents for the tunable laser where this mode is present which can in turn be converted to output frequency of the tunable laser; and

means to convert the mode width to a percentage deviation of average mode width of the tunable laser.